samk | Research Center WANDER

Real life Living Lab studies of new antimicrobial nanocoatings for touch surfaces

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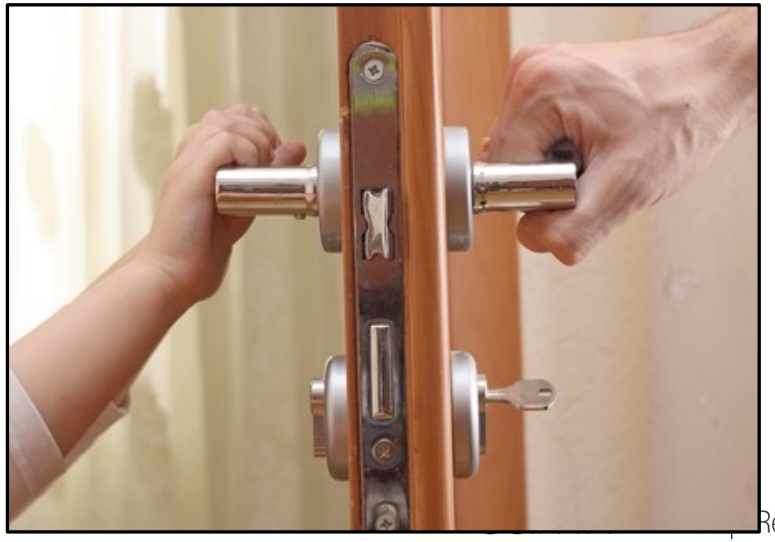
Research Center WANDER

- Research and expert services related to **water**, **materials in contact with water** and **indoor environment hygiene** – locally, nationally and internationally.
- Co-operation with ca. 250 organizations like ministries, national and international companies, universities and research institutes

Research of **antimicrobial coatings**, indoor hygiene and the solutions of hygienic construction.

- Studying antimicrobial coated products in real life settings (e.g., hospital, kindergarten, elderly care)
- Developing comprehensive indoor hygiene (IH) concept (surfaces, water, air) and participating in commercialization processes of IH products
- Participating in standardization work, like ISO TC330 - Surfaces with biocidal and antimicrobial properties
- Studying biofilm management using nanobubbles



STOP – Surface Transfer of Pathogens

The STOP project will develop **antimicrobial nanocoatings** that can be flexibly or permanently applied to **high-touch surfaces**.

Several different active substances will be explored (i) to allow formulation in highly flexible, **sprayable**, and long-lasting coatings, (ii) provide broad spectrum antimicrobial activity, and iii) reduce the chances of the development of resistance.

This effect will be studied in **a real-life intervention trail** and with epidemiological models.

The developed nanocoatings are expected to lead to significant **reductions in infectious diseases** transmitted from high-touch surfaces, healthcare **cost savings**, reduction in environmental pollution by disinfectants, and increased preparedness of the EU public health system to future pandemics.

The **safety** of the nanomaterials will be backed up by human and environmental toxicity studies and life cycle analyses.

From the beginning, attention will be paid to end-user acceptance, manufacturing scalability, and short-term exploitation by SMEs.

https://www.wander.fi/en/projects/STOP/

STOP

09/22 – 08/26, Horizon Europe, 4.3 M€
BAM – Coordinator
UoB – Scientific coordinator

BAM, Federal Institute for Materials Research and Testing
Germany

Affix Labs Oy
Finland

Amanuensis GmbH
Switzerland

Apel Laser SRL
Romania

Prolepsis Institute
Greece

Empa
Switzerland

Fraunhofer-Gesellschaft
Germany

The Foundation for Research and Technology - Hellas (FORTH)
Greece

Institute of Electronics Bulgarian Academy Of Sciences
Bulgaria

King's College London
United Kingdom

Ruđer Bošković Institute
Croatia

Satakunta University of Applied Sciences, Research Center WANDER
Finland

University of Tartu
Estonia

University of Birmingham
United Kingdom

University of Trieste
Italy

STOP – Work packages

WP Number	WP Name	WP leader
WP1	Project management	BAM
WP2	Nanomaterials for safer surfaces	UoB
WP3	Surface structuring for antimicrobial activity	IE-BAS
WP4	Formulation and application of coatings to surfaces	FORTH
WP5	Demonstration of the efficacy of new antimicrobial coatings in relevant environments	**SAMK**
WP6	Understanding mode-of-action and controlling adverse effects	BAM
WP7	Exploitation, dissemination & communication	AMAN

WANDER's actions in STOP project

- **WP5 – Demonstration of the efficacy of new antimicrobial coatings in relevant environments (SAMK WANDER as WP leader)**
- WP5 is designed to filter the large number of candidates down to the most potent coatings and provide feedback to WP3&4 on potential improvements or refinements to increase antimicrobial efficacy.
- Antimicrobial efficacy will be tested at various complexity levels, beginning with laboratory standard assays and finishing with real-life exposures (demonstration in relevant environment).
- **Task 5.4 Antimicrobial efficacy testing under real-life conditions**

Task 5.4 Antimicrobial efficacy testing under real-life conditions (M25-M48, SAMK, UT, Prolepsis)

- The **two most promising antimicrobial coatings** selected in Task 5.3 are evaluated at **2-3 pilot sites**, like nursing homes, in different partner countries and in collaboration with end-users.
- 15 reference rooms and 15 intervention rooms with 2 m^2 antimicrobial surfaces per room located at high traffic locations will be used.
- From the surfaces, microbial counts and species (qPCR) will be followed over 6 months, starting from month 36.
- The efficacy testing protocol will be adapted to the local needs, enabling comparison of the efficacy of antimicrobial coating vs. traditional coatings under similar microbial burden and environmental conditions.

WANDER, current status in STOP project

- Data collection in HEAL project started 3/2022 → provide valuable input to define study set up details in STOP project
- Planning of study set up details started
- Request submitted to the local Ethics Committee for a preliminary ethics review of STOP. → Accepted 9/2023
- Discussions started with possible pilot sites.

Building up a Living Lab pilot site

- Actors
  - Management
  - Contact persons
  - Users (staff, ”clients”)
  - Relatives
  - Maintenance
  - Cleaning
  - Companies (products, solutions)
  - Researchers

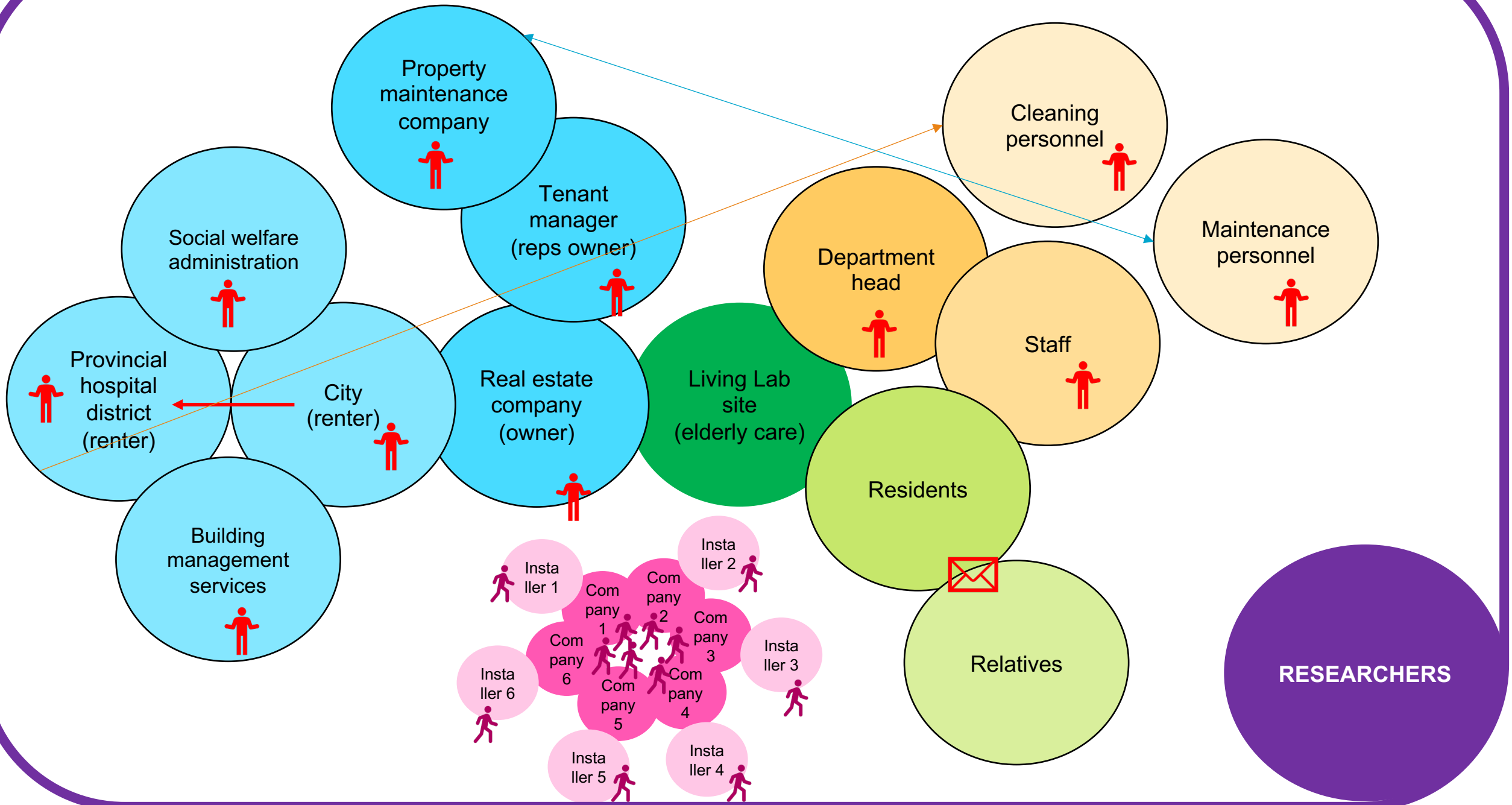
Blackmail, **bribery,** threats

- Endless discussions
- Careful with toes
- Communication, communication, communication

- Never assume that anyone knows anything!

Building up a Living Lab pilot site

Permit to conduct research



WANDER's scientific publications on indoor hygiene and antimicrobial coatings

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- Mäki A, Salonen N, Kivisaari M, Ahonen M, Latva M (**2023**) Microbiota shaping and bioburden monitoring of indoor antimicrobial surfaces. Front. Built Environ. 9:1063804. https://doi.org/10.3389/fbuil.2023.1063804
- Blomberg E, Herting G, Rajarao GR, Mehtiö T, Uusinoka M, Ahonen M, Mäkinen R, Mäkitalo T & Odnevall I (**2022**) Weathering and antimicrobial properties of laminate and powder coatings containing silver phosphate glass used as high touch surfaces. Sustainability 14(12), 7102. https://doi.org/10.3390/su14127102
- Ivask A, Ahonen M, Kogermann K (**2022**). Antimicrobial Nano Coatings. Nanomaterials, 12, 4338. https://doi.org/10.3390/nano12234338
- Salonen N, Mäkinen R, Ahonen M, Mäkitalo T, Pelto-Huikko A, Latva M (**2022**) A comprehensive indoor hygiene concept for infection prevention and control within built environments. Front. Built Environ. 8:1075009. https://doi.org/10.3389/fbuil.2022.1075009
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- Adlhart C, Verran J, Azevedo NF, Olmez H, Keinänen-Toivola MM, Gouveia I, Melo LF, Crijns F (**2018**) Surface modifications for antimicrobial effects in the healthcare setting: a critical overview. J Hosp Infect; 99: 239-249. https://doi.org/10.1016/j.jhin.2018.01.018
- Dunne SS, Ahonen M, Modic M, Crijns FRL, Keinänen-Toivola MM, Meinke R, Keevil CW, Gray J, O'Connell NH, Dunne CP (**2018**) Specialised cleaning associated with antimicrobial coatings for reduction of hospital acquired infection. Opinion of the COST Action Network AMiCI (CA15114). Journal of Hospital Infections 99(3):250-255. https://doi.org/10.1016/j.jhin.2018.03.006
- Ahonen M, Kahru A, Ivask A, Kasemets K, Kõljalg S, Mantecca P, Vinković Vrček I, Keinänen-Toivola MM, Crijns F (**2017**) Proactive approach for safe use of antimicrobial coatings in healthcare settings: opinion of the COST Action network AMiCI. Int J Environ Res Public Health. 14(4). http://dx.doi.org/10.3390/ijerph14040366.
- Inkinen J, Mäkinen R, Keinänen-Toivola MM, Nordström K, Ahonen M (**2017**) Copper as an antibacterial material in different facilities. Letters in Applied Microbiology, 64(1): 19-26. https://doi.org/10.1111/lam.12680.
- Mäkinen, R., Miettinen, I.T., Pitkänen, T., Kusnetsov, J., Pursiainen, A., Kovanen, S., Riihinen, K. & Keinänen-Toivola M.M. (**2013**). Manual faucets induce more biofilms than electronic faucets. Canadian Journal of Microbiology, 59(6), 407-412. https://www.ncbi.nlm.nih.gov/pubmed/23750955

Thanks!

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https://www.wander.fi/en/

THINK FUTURE.

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